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Medicinal Plants in East and Central Africa: Challenges and Constraints

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Abstract

In East and Central Africa, medicinal and aromatic plants play an important role in the health of millions of people. Demand for medicinal plants is increasing as the population grows. Over-use of the medicinal and aromatic plants cause further economic, social and ecological deterioration. The traditional knowledge, uses and economic contribution of medicinal and aromatic plants to the rural economy in the region were studied. The direct and indirect effects of the human activities on this region are discussed. This paper also discusses challenges and constraints in relation to conservation. Strategies for enhancing the development of a medicinal and aromatic plants industry are suggestive.

Introduction

The use of traditional medicines remains widespread in developing countries while the use of complementary alternative medicine (CAM) is increasing rapidly in developed countries. Only a few African phytomedicines are available in the international market, however, African medicinal plants play a key role in basic healthcare, particularly in rural areas due to their accessibility and affordability.

East and central Africa is a region on the African continent that includes the countries of Somalia, Kenya, Sudan, Chad, Central African Republic, Tanzania, Uganda, Burundi, Congo and Rwanda,

The revival of interest in the use and importance of African medicinal plants by the WHO and many developing countries has led to intensified efforts on the documentation of ethnomedical data of medicinal plants, since most traditional healers keep no records and their information is passed on, mainly verbally, from generation to generation. Research has been geared towards finding scientific evidence for the claims as to the therapeutic efficacy of African herbs by traditional healers. Most of the published and unpublished written ethnomedicine data with valuable and complementary information are scattered in many documents, some of which are not easily available. An interdisciplinary systematization, which certainly help to predict the most promising candidates for

further laboratory or clinical investigations, appears as useful work.

In continuation of our work to bring up to date East and Central African ethnomedicine data, the present paper reports medicinal plants together with some traditional beliefs about them.

Methodology

I have collected and organized selected information from the literature and from our own ethnobotanical work. Major local Sudanese, Kenyan, Tanzanian, Rwandan medicinal plants were then listed with its vernacular name, scientific name, family and uses where available. Ten plant species that have the greatest number of different medicinal uses in the region with detailed information were recorded.

Results and Discussion:

In the following enumeration, plants are arranged alphabetically, followed by the local name, family name and uses or chemical constituents, where available.

Major local Sudanese medicinal plants:

Acacia nilotica (L.) Del.ssp. *nilotica* (Garad) , Mimosaceae. Fruit for cough, pustular diseases, catarrh, fever and measles.

Adansonia digitata L. (Gongoleis), Bombacaceae. To stop diarrhea, as febrifuge.

Ambrosia maritima L. (Damsisa), Asteraceae. To treat backache , stomach pains, malaria and for gastro-intestinal disturbances.

Balanites aegyptiaca (L.) Del. (Lalob), Balanitaceae. As a laxative, anthelmintic, jaundice.

Cassia acutifolia Del., (Senna), Caesalpiniaceae. Fruit for fever, as a laxative, carminative, as antihelmintic.

Croton zambesicus Muell. Arg. (Um Gleigla), Euphorbiaceae. Antimalarial.

Citrus colocynthis (L.) Schrad. (Handal), Cucurbitaceae. For pustules in the skin.

Haplophyllum tuberculatum (Forsk.) A. Juss. (Haza), Rutaceae. Antispasmodic, decongestant, carminative.

Hibiscus sabdariffa L. (Karkadeh), Malvaceae. As a mild laxative, cough, antihypertensive agent.

Lawsonia inermis L. (Henna), Lythraceae. To treat boils and wounds.

Nauclea latifolia Sm. (Karmadoda), Rubiaceae. As antipyretic in malarial fevers.

Solenostemma argel (Del.) Hayne. (Hargel), Asclepiadaceae. Antispasmodic, digestive, to relieve menstrual pain and as appetizer in puerperium.

Tamarindus indica L. (Aradaeb), Caesalpiniaceae. To relieve fever, in cases of nausea, as laxative , to relieve malarial fever.

Major local Kenyan and Tanzanian Medicinal Plants:

Commiphora molmol . In Kenya for the resin , an oral antiseptic.

Embelia schimperi. Fruit for worms , stem bark for cramps.

Entada abyssinica. Root for arthritis, roasted seed for conjunctivitis.

Erythrina senegalensis. Root for toothache, venereal diseases.

Holarrhena floribunda. Bark for dysentery, fever, snake bite.
Kigelia africana. Parturition, splenitis.
Jateorrhiza palmate. Bronchitis, hypertension, impotence.
Mitragyna ciliate. As analgesic as codeine.
Morinda citrifolia. Dysentery, hypertension.
Picralima nitida. Fever, hypertension, jaundice, malaria.
Quassia africana. Bronchitis, dysmenorrhea, fever, pneumonia.
Sansevieria liberica. Conjunctivitis, convulsions, hemorrhoids.
Stephania dinklagei. Corydine (Sedative), stephanine.
Tinospora caffra. Fever, tonic.
Trichilia emetica. Bark antidermatitis, antiinflammatory, emetic.
Zanthoxylum zanthoxyloides. Berberine, chelerythrine: antisickle cell.

Major local Rwandan medicinal plants:

Aspilia pluriseta. Worms, wounds.
Bidens pilosa. Furuncle, hepatitis, otitis, wounds.
Guizotia scabra. Agalactia, gonorrhoea, hepatitis.
Senecio maranguensis. Cough, otitis, wounds.
Spilanthes mauritiana. Malaria, pneumonia, tonsillitis.
Vernonia amygdalina. Ascariasis, hepatitis, malaria.
Cassia didymobicola. Ascariasis, neuropsychopathy.
Chenopodium ugandae. Eczema, hepatitis, snake bite.
Leonotis nepetaefolia. Hepatitis, pneumonia, wounds.
Entada abyssinica. Ascariasis, fever.
Phytolacca dodecandra. Emetic, otitis, pneumonia.

African Medicinal Plants in World Trade:

Cassia acutifolia. Senna. The laxative synergic Sennosides.
Harpagophytum sp. Rheumatic ailments.
Jateorrhiza palmata . Root.
Phystostigma venenosum. Antiglaucomic, physostigmine.
Pygeum africanum . Prostate remedy.
Rauvolfia vomitoria. Reserpine, yohimbine.
Tamarindus indica. Hydroxycitric acid.
Warburgia ugandensis. Polygodial: antifeedant, antiyeast.
Withania somnifera. Withaferin, withanolides.

Plants species that have the greatest number of different medicinal uses in the region

1. ***Prunus africana*** (Hook.f.) Kalkm (syn. *Pygeum africanum* Hook.f.) commonly known as red stinkwood or bitter almond has traditionally been used for centuries by African traditional healers to treat genitourinary disorders. In the 1960s *Pygeum* came to the attention of French scientists who

began to investigate its benefits in the treatment of Benign Prostatic Hyperplasia (BPH). The commercial lipophilic extract of *Pygeum* is the favourite phytomedicine used to treat prostate cancer, prostatitis and especially BPH in Europe (Van Wyk *et al.*, 1997). *P. africana* grows preferentially at a level of 1,000 – 2,500 m in the mountain forests of region in Ethiopia, Sudan, Kenya, Uganda, Tanzania and Eastern Congo.

2. *Commiphora myrrha* :

The genus *Commiphora* (Burseraceae) comprise over 150 species, most of which are confined to Eastern Africa, with few species also occurring in Arabia and India. Myrrh, a culturally and commercially important resin product, is derived from *Commiphora myrrha* (Nees) Engl., a tree found in abundance in the dry and arid regions of Ethiopia and Somalia and to some extent in northern Kenya (Vollesen, 1989). The resin is masticated as antiseptic. A paint is prepared for skin diseases and pustular complaints. Resins obtained from various other species of *Commiphora* are used as substitute of *C. myrrha* (myrrh), and the practice is widespread. This complicates the characterization of myrrh, because most previous chemical studies reported on the resin were based on commercial material, and not on a product obtained from properly identified trees.

3. *Plectranthus spp.*

Plectranthus is a large and widespread genus with a diversity of ethnobotanical uses. Monoterpenoids, sesquiterpenoids, diterpenoids and phenolics have been reported in species of *Plectranthus*. A survey of the ethnobotanical information by geographical area shows that 45 species are used in African continent (Kokwaro, 1993). In Africa, the most frequently used species are *Plectranthus barbatus* and *P. laxiflorus*.

Plectranthus barbatus is used to treat a wide range of diseases (13 categories). *P. barbatus* is used to treat a wide variety of digestive problems (stomachache and as a purgative, for nausea and for gastritis and intestinal spasms.

In Kenya and the Democratic Republic of Congo, *P. barbatus* is used in the treatment of wounds and ringworms, to reduce swelling on bruises. *P. barbatus* is used to treatment a range of infections including throat and mouth infections, tonsillitis, gastro-intestinal infections and to break fevers in East Africa.

Labdane diterpenoids found in *P. barbatus*, include forskolin. The fact that forskolin directly activates adenyl cyclase and thus the modulation of cAMP could underlie the diversity of different traditional uses of forskolin-containing species of *Plectranthus* , such as *P. barbatus*. For example, activation of adenyl cyclase can stimulate gastric secretions and the presence of forskolin in *Plectranthus barbatus* could explain why extracts from the plant are used for the treatment of digestive disorders (Mukherjee *et al*, 2000). Forskolin is a known cardiogenic agent and it is also effective in the treatment of hypertension (Ghisalberti, 1977); Valdes *et al.*, 1987). Thus, forskolin could explain why extracts of *P. barbatus* are reported to lower blood pressure of anaesthetized rat due to relaxation of vascular smooth muscle (Dubey *et al.*, 1981).

Plectranthus laxiflorus is used in Ethiopia to treat teeth and gum disorders, as a purgative.

4. *Hymenodictyon parvifolium* Oliv. (Rubiaceae) :

The stem bark is used in Kenya folk medicine as a remedy for skin diseases, venereal diseases and dysentery. In Tanzania, an infusion from the plant in combination with other plants is used for

treatment of insanity when the patient is noisy, abusive and suicidal (Mathias, 1982).

5. *Solanum aculeastrum* Dunal. (Solanaceae):

A decoction of the root bark is used in Kenya for sexually transmitted bacterial diseases including gonorrhea while the juice from the berries used for treating jigger infestations as well as acne (Kokwaro, 1993).

6. *Lippia multiflora* Moldenke (Verbenaceae):

Commonly known as “Tea of Gambia”, is a plant widely used in Africa as infusion preparation. In folk medicine in Congo, it finds extensive use in hepatic insufficiency and fever. The pharmacological studies showed that crude extract of this plant possess a sedative and analgesic effect. (Abena *et al.*, 2003).

7. *Vernonia amygdalina* Del. (Asteraceae):

Known as “bitter leaf” is a widely used medicinal plant in Africa. It is applied in various ailments (Iwu, 1993). The leaves are reputed to be an effective remedy for fevers and gastro-intestinal disorders. The fresh leaves are believed to be abortifacient and also used in purgative enemas. The leaf extract of *V. amygdalina* yields a sesquiterpene lactone vernolepin which possesses antiplatelet activity (Venton *et al.*, 1991).

8. *Taddalia asiatica* (L.) Lam. (Rutaceae):

This plant is used traditionally in Kenya by many communities for the treatment of malaria and other ailments. All parts of the plant are claimed to have medicinal value, but the roots in particular are believed to be more potent. Decoctions or infusions of the roots are drunk to treat malaria, fever and to cure stomachache. For toothache the root is chewed whereas for the treatment of coughs the fruits are chewed (Kokwaro, 1993; Beentje, 1994; Watt and Breyer-Brandwijk, 1962). The ethyl acetate extract of *T. asiatica* root contains a coumarin derivative, as the major antimalarial principle of this extract (Oketch-Rabah *et al.*, 2000).

9. *Entada abyssinica* Steus. Ex A.Rich. (Mimosaceae):

Is a tree that is found all over tropical Africa. The plant has been used for the treatment of bronchitis, coughs and to alleviate arthritic pains (Kokwaro, 1976). It is also used in the treatment of miscarriage, fever and abdominal pain. The juice of *E. abyssinica* is employed as an instillation for eye inflammation (Watt and Breyer-Brandwijk, 1962). *E. abyssinica* has been demonstrated to be antibacterial, antitrypanocidal and antifungal in various studies (Iwu, 1993).

10. *Cymbopogon densiflorus* Stapf. (Poaceae):

The plant is traditionally used in Congo against various diseases such as asthma, fever, cold, epilepsy, abdominal cramps and pains, as well as in the culinary domain and in the making of perfumes (Takaisi-Kikuni *et al.*, 200).

Most East and Central African countries with frequent usage of ethnomedical treatments have many traditional healers preparing herbal remedies or providing preparation instructions to local populations. These healers could be used to great advantage if they were organized and encouraged to

use only efficacious and safe herbal remedies while discouraging the use of ineffective and potentially toxic remedies. By performing scientific evaluations of efficacy for local ethnomedical preparations as well as organizing and disseminating scientific information to the local traditional healers, we could provide indigenous populations better access to efficacious drug treatment and an improved health status for those who cannot afford the benefits of modern medicines.

Industry and the conservation of medicinal plants

Medicinal plants represent a primary source of products for the pharmaceutical industry. Large quantities are used in the preparation of infusions and decoction where traditional medicine is still of great therapeutical, social and economic importance and in the so-called industrial countries, where an over-growing proportion of the population is using medicinal plants for self-medication. In ecological terms, the continued use of wild plants may cause incalculable damage to the environment and fauna include. The danger is still more serious when parts of medicinal plants such as the roots, seeds and flowers, which are essential to the survival of the plant itself are used. In terms of quality, wild plants are often heterogeneous as regards age, zone and period of picking, drying methods and, consequently, active constituents content.

African medicinal plant resources may be doomed to extinction by over-exploitation resulting from excessive commercialisation, habitat destruction and other natural and man-made destructive influences unless energetic conservation measures are taken to ensure their continued availability.

At present, in East and Central African countries, there are no country-wide quantitative data available on the supply of, or consumer demand for, medicinal plants and an economic benefits derived by the use of medicinal plants and their contribution to healthcare. Similarly, most collectors/producers and end users are unaware of the extent to which the expanding demand in medicinal plants is threatening the survival of increasing number of medicinal plants species. The prices paid to collectors tend to be very low, and resources are frequently open-access or common property. As a result, commercial plant gatherers often “mine” the resources rather than managing them.

Urgent action needed for African medicinal plants

Many wild medicinal plants are becoming scarce in East and Central African countries. Failure to stabilize the status of these plants would negatively effect not only the environment but also the health of millions of people in this region.

The greater use of medicinal plants is for local use rather than export to foreign markets, but demand often exceeds supply and appears to be increasing. The vast majority of the plants used are taken directly from the wild. Where some species are already critically endangered and the status of others becoming precarious. In many cases, the status of valued medicinal species is simply unknown.

The conservation of medicinal plant resources in East and Central Africa will require management, awareness, regulation and research initiatives by a range of institutions. Solutions to the problem of increasing pressure and scarcity of wild medicinal plants are:

Actions for specific species, increased collaboration with traditional healers to promote propagation of endangered medicinal plants and sustainable harvest techniques, and public awareness activities aimed at regulatory agencies in the region. Demand for wild medicinal plants appears to be increasing and as

it does so it will become necessary to increase the supply. For endangered and critically endangered species, efforts should be made to discourage use of the medicinal species, until the status of the species improve.

In most African countries, there is a cadre of highly-trained professionals whose talents and expertise in the field of plant chemistry, pharmacognosy, pharmacology, natural resource management, and the industrial utilization of medicinal plant-based products are underutilized. These professionals acknowledge their indebtedness to traditional healers and birth attendants and the need to work together to establish processes to manage and validate traditional medicine. At present, both levels of knowledge capital (traditional and scientifically-based) are underutilized. To maximise the potential of African traditional medicines as a source of healthcare the safety, efficacy and quality need to be assessed. There are numerous herbal remedies that could hold the potential of being effective but still need investigation.

Recommendations

- 1) The collection of medicinal plant materials from wild sources for use, trade for industrial use should be managed on sustainable bases. Efforts should be made to conserve natural resources and to domesticate selected plant species. A high level of pharmacological content should be ensured, using modern cultivation and preparation methods. The systematic cultivation of medicinal herbs could facilitate industrial scale processing.
- 2) The formulation of an appropriate regional strategy should constitute an important, initial step towards the utilization and industrialization of medicinal and aromatic plants. For this purpose, the governmental research organizations should establish regional/national committees comprising experts from the sectors of industry, agriculture, health and commerce as well as from related research institutions. These committees could help to promote the developmental programmes of the subsector and to formulate policies, strategies and put forward plans for its sustainability. These policies should cover, at the minimum, aspects such as:
 - a. The country-wide promotion of the use of herbal medicines as well as their incorporation in the national health-delivery system such a programme could form part of the promotion of the national heritage;
 - b. The formulation and/or strengthening of policies for establishing national during regulatory and registration authorities for plant-based medicines;
 - c. The enactment of policies that will facilitate the development of small- and medium- scale industries for the production of essential oils from aromatic plants for local consumption and export; this should attract a large rural sector and alleviate the living conditions of collectors, encourage cultivators and local traders.
 - d. The incorporation of conservation as the central theme in policies related to the sustainability and adequate development of this subsector.
- 3) Ethnomedical studies can be utilized to understand the social, cultural and economic factors influencing ideas and actions concerning health and illness, and also to get information on types of diseases and health problems prevalent among the people of a particular locality. Such studies may help to provide the basic health-care services to the greater part of the rural population

in an effective way, provided that such studies are conducted hand-in-hand with phytochemical, pharmacological and perhaps clinical studies.

4) Processing of herbal medicines from local materials for local industries with simple dosage forms being standardised and packages at low cost using appropriate technology.

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